

Common Mistakes in Write-up

Mistake #1 Misjudging Audience:

Your audience is another physicist of your skill (one of your peers **not in this class**). You **can assume** they know the same level of physics as you but that is it. You **cannot assume** that they know anything about your lab. Your write-up **needs to stand alone**. One of your physics peers should be able to read it and understand what you did, why, and why the data is interesting/significant. Guide the reader by the hand. Granted you do not need to over-explain. That is why we have a reference section. For example, don't explain the theory behind the method of least squares (unless this is the main point of the lab), but do say that you used it, and where it can be found by proper referencing.

Mistake #2 Leaving out Figures and Description of Figures:

Your figures are really the structure that holds the write-up together. A nice way to write a scientific paper is to determine what figures you should use to tell the story you want to tell. Your lab report connects the graphical story with words. Make sure to embed figures in the write-up, and include captions. Make sure to describe what you are showing. If it is a plot, how did you manipulate any of the information (i.e. linearize?), did you curve fit? what are the main results (maybe it is a slope)? how did you calculate error bars? There is a big story inside these figures that should be told.

Mistake #3 Subjective Evaluation of Results:

I do want you to make value judgments on your data, but in a scientific way. When I say comment on how “good” your results are, I mean did you successfully prove what you set out to accomplish?

You cannot say, “My data was good.” “Good” means very different things to different people. For scientists at NIST it may mean 1 part in 10^{19} . For high-energy physicists it may mean being within a factor of 10. So you need to qualify what “good” means. You can say things like “The 1% error from the theoretical value demonstrates the validity of our model.” or “The excellent match of the experimental data to theory shows that the distribution is a Gaussian.” or something like “The low number of statistics does not allow us to make a precision measurement.” or “The theoretical value falls within the error of our measurement, indicating a successful measurement technique.” Basically, to make a value judgment in scientific writing, you need to give a scientifically based reason why something is successful or unsuccessful. The more quantitative support you have behind the reason, the stronger your claim will be.